Serial No.: 10/697,511
Atty Dckt: MIO 0092 VA/40509.271

Remarks

By this response, claims 1 and 18 are amended. Accordingly, claims 1-19 are pending in this application.

Claim 18 and 19 were objection to for the reasons noted in the Official Action, which has been taken care of by the above amendment.

Claims 1-19 are rejected under 35 USC 103(a) as being unpatentable over Sandhu et al (US 2003/0102008) in view of Miller et al (US 6,200,389). This rejection is respectfully traversed.

The Applicant has filed herewith a Rule 132 declaration, in which the Applicant has unequivocal declared that he conceived and invented the portions of U.S. Patent Application Publication 2003/0102008 A1 relied on as prior art against claims 1-19. As such, U.S. Patent Application Publication 2003/0102008 A1 is not prior art to the above identified patent application. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 1 and 3-18 are rejected as being unpatentable over Elliott et al (US 5,669,979) in view of Miller et al. Claims 2 and 19 are rejected as being unpatentable over Elliott et al and Miller et al, as applied to claims 1 and 3-18, and further in view of Nakayama et al (US 4,924,807). These rejections are respectfully traversed.

Elliot et al. teach a method of cleaning a substrate surface, the cleaning being done photoreactively without damaging the surface. A laser beam of UV radiation is delivered at an acute angle to the surface of the substrate, the beam striking the surface at a long and narrow reaction region. The beam and the substrate are moved relative to one another to cause the beam to sweep the surface. While the beam is sweeping the surface, a flow of a reactant gas is provided at the reaction region so that the gas is excited by the UV laser beam. The acute angle of the beam is of a value such that foreign material is removed without essentially damaging the surface of the substrate or leaving a residue that would inhibit further processing of the substrate surface (abstract, emphasis added).

Applicants note that there are repeated mentions by Elliot et al. of striking the workpiece surface with a beam having a knife edges (column 10, line 14 and column 20, line 23) and that the beam is focused on the surface (column 11, lines 42 and 63-64, column 12, line 19, among other places). The most straightforward way of using this beam is to deliver the beam directly from the laser source to the substrate surface or to use one or two spherical lenses or mirrors to

form a magnified or demagnified image of the beam at the substrate surface (col. 9, lines 47-52). Applicants note that nowhere in the disclosure of Elliot et al. is there any teaching or suggestion of having "a source having optics which converge a beam...in close proximity to the surface of the workpiece, but spaced a finite distance therefrom" as recited in amended claim 1.

Also, Elliot et al. explicitly teach that "foreign material 10 may be removed from a surface 11 of a substrate 12, by delivering to the foreign material energy 14, which ablates the foreign material from the surface, i.e., the components of the foreign material dissociate into, e.g., molecules, free radicals, and small particles ("ablation components") which expand and rise above the substrate surface as a cloud 16....[where] an input fluid 18...is used to reduce or prevent the ablation components of the foreign material in the cloud from redepositing onto the substrate surface by, e.g., reacting with the ablation components to form simple gases ("reaction products," e.g., gases) or entraining the ablation components in a gas flow away from the substrate." Column 5, lines 1-59 (emphasis added). Elliot et al further mentions that "[c]areful selection of certain reaction conditions ensures that most of the ablation components in the cloud completely react with reactive species in the input gas, instead of forming particulates or other materials that redeposit onto the substrate surface." Column 6, lines 8-12 (emphasis added). As Elliot et al. is directed to a cleaning system which removes materials from the surface of a workpiece, Elliot et al. clearly teach away from using in their system an apparatus adapted for use in a reaction chamber for atomic layer deposition of a material onto a surface of a workpiece, such as recited by amended claim 18.

Further, unlike it has been suggested by the Examiner, Applicants were unable to find where in Elliot et al. it is disclosed or suggested that a number of process steps may be carried out simultaneously using separated feed gases impinging the surface of the workpiece via a dispensing unit having input and evacuation nozzles, such as recited by claims 1 and 18.

Miller et al is cited for teaching an integrated injector having input and evacuation nozzles. However, Applicant notes that although Miller et al. discloses keeping the feed gases separate from each other, this is to prevent deposition of a non-uniform film from pre-reaction, reactions by excessive gases, and/or gaseous by-products. See, e.g., Column 1, lines 47-52. No where is it mentioned by Miller et al that the supplying of different gases is for the purpose of performing different processes simultaneously in the same process chamber as suggested by the Examiner. As the focus of the invention of Elliot et al is on cleaning a substrate surface, pointing

generally to Miller et al. which is directed to chemical vapor deposition, clearly does not satisfies the Examiner's burden of pointing out with particularly the motivation Miller provides to one skilled in the art to modify the specifically design injector nozzle of the cleaning system of Elliot et al. with the chemical vapor deposition injector of Miller et al. Furthermore, there is no recognition in either references that the CVD injector of Miller et al is suitable for use in the cleaning system of Elliot et al. Accordingly, other than Applicants' own specification, there is no motivation provided in the cited references for why one skilled in the art would look to the deposition nozzle of Miller et al. to modify the cleaning system of Elliot et al. as suggested by the Examiner.

Moreover, even if the nozzle of Elliot et al was reconfigured as suggested by the Examiner with the injector and evacuator ports of Miller et al., such a combination would not result in the claimed invention, and also would make the inventions of Elliot et al. and Miller et al. inoperable for their intended purpose. As mentioned above, Elliot et al is directed to cleaning the surface of a substrate by impacting the beam onto a workpiece which ablates surface materials and prevents such ablated material for reacting and redepositing on the surface. Miller et al. is directed to depositing a uniformed CVD film by reacting chemicals on the surface. As Miller lays down a uniform CVD layer, such a layer is removed or possibly pitted by the laser of Elliot et defeating the intended purposes of these inventions. The recited invention of claims 1-19 produces no such results.

Further, the combination would fail to provide an apparatus which includes "a source having optics which converge a beam of electromagnetic radiation in said flow of said input gas in close proximity to the surface of the workpiece, but spaced a finite distance therefrom, to dissociate said input gas into a high flux of generated reactive gas species that reacts with said surface reactant to chemically treat said surface of said workpiece" as recited by amended claim 1, or "an apparatus adapted for use in a reaction chamber for atomic layer deposition of a material onto a surface of a workpiece, comprising a first gas port adapted to provide a flow of an input gas over the surface of the workpiece to be dissociated by a radiation beam into a point of use generated reactive species; a second gas port adapted to provide a direct flow of a precursor gas onto the surface of the workpiece which by chemisorption forms a first surface reactant; a third gas port adapted to flow a purge gas to prevent mixing of said input and precursor gases; and, a pair of evacuation ports adapted to evacuation at least said purge gas" as

recited by claim 18. Nakayama et al is cited for teaching the supply of a transmission gas through a port. Accordingly, Nakayama et al. fail to cure the noted motivation, inability to combine, and missing limitations problems of Elliot et al and Miller et al. In view of all the above reasons, withdrawal of the obviousness rejections is respectively requested.

The Applicant respectfully submits that, in view of the above amendments and remarks, the application is now in condition for allowance. The Examiner is encouraged to contact the undersigned to resolve efficiently any formal matters or to discuss any aspects of the application or of this response. Otherwise, early notification of allowable subject matter is respectfully solicited.

Respectfully submitted,

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